ABSTRACT:

This paper presents a new design of the torque and stator flux estimators for Direct Torque control (DTC) for Field Programmable Gate Array (FPGA) implementation, which permit very fast calculations. An alternative variable word-size approach in two's complement fixed-point format is used for the implementation, in order to minimize calculation errors and the hardware resource usage. The simulation results of DTC model in Matlab, which performed double-precision calculations, are used as references to digital computations executed in FPGA implementation. The Hardware-in-the-loop (HIL) method is used to verify the minimal error between Matlab simulation and the experimental results, and thus the well-functionality of the implemented estimators.